

1. An LED light bulb adapted for use in standard automotive bayonet type bulb sockets in a brake light mode and a tail light mode, comprising:

a printed circuit board;

a plurality of light emitting diodes mounted on the printed circuit board and electrically coupled with the printed circuit board;

a body having a first end and a second end, with the printed circuit card attached to the first end of the body;

a base having a sidewall, a distal end and a proximal end, the sidewall having two alignment pins thereon, the distal end having at least one contact; and

electrical control means electrically connected between first and second contacts on the base and the printed circuit board, whereby when an electrical signal is supplied to the contacts the electrical control means transmits a processed electrical current enabling the light emitting diodes to be energized and emit light, wherein the electrical control means causes substantially all light emitting diodes to illuminate when used in either the tail lamp mode or the brake lamp mode, and causes the intensity of the individual light emitting diodes to be greater when in brake lamp mode than when in tail lamp mode.

2. An LED light bulb as in claim 1 wherein the body contains a plurality of cooling holes.

3. An LED light bulb as in claim 1 wherein the electrical control means comprises a resistor.

4. An LED light bulb as in claim 1 wherein electrical control means comprising a resistor electrically connected between the first contact and the printed circuit board and a resistor-diode series combination electrically connected between the second contact and printed circuit board.

5. An LED light bulb adapted for use in standard automotive bayonet type bulb sockets comprising:

a printed circuit board;

a plurality of light emitting diodes mounted on the printed circuit board and electrically coupled with the printed circuit board;

a body having a first end and a second end, with the printed circuit card attached to the first end of the body;

a base having a sidewall, a distal end and a proximal end, the sidewall having two alignment pins thereon, the distal end having at least one contact; and

electrical control means electrically connected between at least one contact on the base and the printed circuit board, whereby when an electrical signal is supplied to the contact the electrical control means transmits a processed electrical current enabling the light emitting diodes to be energized and emit light, wherein the electrical control means comprises means for producing a series of electrical pulses and applying the electrical pulses to the printed circuit board when an electrical signal is applied to a contact on the base.

6. An LED light bulb adapted for use in standard automotive bayonet type bulb sockets in a brake light mode and a tail light mode, comprising:

a printed circuit board;

a plurality of light emitting diodes mounted on the printed circuit board and electrically coupled with the printed circuit board;

a base having a sidewall, a distal end and a proximal end, the sidewall having two alignment pins thereon, the proximal end attached to the printed circuit board, the distal end having at least one contact; and

electrical control means electrically connected between first and second contacts on the base and the printed circuit board, the printed circuit board being attached to the proximal end of the base, whereby when an electrical signal is supplied to the contacts the electrical control means transmits a processed electrical current enabling the light emitting diodes to be energized and emit light, wherein the electrical control means causes substantially all light emitting diodes to illuminate when used in either the tail lamp mode or the brake lamp mode, and causes the intensity of the individual light emitting diodes to be greater when in brake lamp mode than when in tail lamp mode.

7. An LED light bulb as in claim 6 wherein the electrical control means comprises a resistor electrically connected between the first contact and the printed circuit board and a resistor-diode series combination electrically connected between the second contact and printed circuit board.

8. An LED light bulb adapted for use in a standard automotive wedge type bulb socket in a brake light mode and a tail light mode, having electrical contacts therein, comprising:

a printed circuit board;

a plurality of light emitting diodes mounted on the printed circuit board and electrically coupled with the printed circuit board;

a body having a first end and a second end, the second end terminating in a wedge shaped portion;

electrical control means electrically connected between the printed circuit board and at least one pair of electrical conductors, whereby when an electrical signal is supplied to the socket the electrical control means transmits a processed electrical current enabling the light emitting diodes to be energized and emit light, wherein substantially all light emitting diodes illuminate when used in either the tail lamp mode or the brake lamp mode, and brake lamp intensity is greater than tail lamp intensity.

9. An LED light bulb adapted for use in a standard automotive wedge type bulb socket having electrical contacts therein comprising:

a printed circuit board;

a plurality of light emitting diodes mounted on the printed circuit board and electrically coupled with the printed circuit board;

a body having a first end and a second end, the second end terminating in a wedge shaped portion;

electrical control means electrically connected between the printed circuit board and at least one pair of electrical conductors, whereby when an electrical signal is supplied to the socket the electrical control means transmits a processed electrical current enabling the light emitting diodes to be energized and emit light, wherein the electrical control means comprises means for producing a series of electrical pulses and applying the electrical pulses to the printed circuit board when an electrical signal is applied to the conductors.

10. An LED light bulb as in claim 8 wherein the electrical control means comprises a resistor electrically connected between the printed circuit board with a second lead of a pair of leads connected to the printed circuit board and a resistor-diode series element electrically connected to one of a pair of leads with the second lead of the pair being connected to the printed circuit board.

11. An LED light bulb as in claim 8 wherein the body contains a plurality of cooling holes.

12. An LED light bulb as in claim 8 wherein the electrical control means comprises a resistor electrically connected between the first contact and the printed circuit board and a resistor-diode series combination electrically connected between the second contact and printed circuit board.

13. An LED light bulb adapted for use in standard automotive wedge type bulb sockets in a

brake light mode and a tail light mode, comprising:

a printed circuit board;

a plurality of light emitting diodes mounted on the printed circuit board and electrically coupled with the printed circuit board;

5 a body having a first end and a second end, a cavity within the body, the body being tapered from the first end to the second end, the first end being larger than the second end, the second end terminating in a wedge shaped portion, the wedge shaped portion having a plurality of bores therein extending from the cavity to the exterior of the wedge shaped portion at the second end of the body with retainers on the exterior sides of the wedge shaped portion;

10 electrical control means mounted within the cavity electrically connected between the printed circuit board and at least one pair of electrical conductors, the electrical conductors extending through the bores exteriorly to the wedge shaped portion wherein conductors of each pair are folded exteriorly to the wedge shaped portion and fixed in the retainers on opposite sides of the wedge shaped portion;

15 an electrically insulating base member including a first portion having an opening therein and a protruding second portion adjacent the first portion for being within a socket having electrical conductors thereon, the wedge shaped portion being securely positioned within the opening, the first portion of the base member thereby providing a cover for each of the externally projecting portions of the conductors passing through the protruding second portion and protruding exteriorly thereof, the first portion of the insulating base member including means for maintaining the externally protruding portions in a predetermined alignment within the first portion and against the protruding second portion such that electrical contact can be provided between the socket and the externally protruding portions of the conductors when the second portion is positioned within the socket, wherein substantially all light emitting diodes illuminate when used in either the tail lamp mode or the brake lamp mode, and brake lamp intensity is greater than tail lamp intensity.

20 14. An LED light bulb adapted for use in standard automotive wedge type bulb sockets comprising:

30 a printed circuit board;

a plurality of light emitting diodes mounted on the printed circuit board and electrically coupled

with the printed circuit board;

a body having a first end and a second end, a cavity within the body, the body being tapered from the first end to the second end, the first end being larger than the second end, the second end terminating in a wedge shaped portion, the wedge shaped portion having a plurality of bores therein extending from the cavity to the exterior of the wedge shaped portion at the second end of the body with retainers on the exterior sides of the wedge shaped portion;

electrical control means mounted within the cavity electrically connected between the printed circuit board and at least one pair of electrical conductors, the electrical conductors extending through the bores exteriorly to the wedge shaped portion wherein conductors of each pair are folded exteriorly to the wedge shaped portion and fixed in the retainers on opposite sides of the wedge shaped portion;

an electrically insulating base member including a first portion having an opening therein and a protruding second portion adjacent the first portion for being within a socket having electrical conductors thereon, the wedge shaped portion being securely positioned within the opening, the first portion of the base member thereby providing a cover for each of the externally projecting portions of the conductors passing through the protruding second portion and protruding exteriorly thereof, the first portion of the insulating base member including means for maintaining the externally protruding portions in a predetermined alignment within the first portion and against the protruding second portion such that electrical contact can be provided between the socket and the externally protruding portions of the conductors when the second portion is positioned within the socket, wherein the electrical control means comprises means for producing a series of electrical pulses and applying the electrical pulses to the printed circuit board when an electrical signal is applied to the externally protruding portions of the conductors.

15. An LED light bulb as in claim 13 wherein the body contains a plurality of cooling holes.

16. An LED light bulb as in claim 13 wherein the electrical control means comprises a resistor electrically connected between a first conductor and the printed circuit board and a resistor-diode series combination electrically connected between a second conductor and printed circuit board.

17. An LED light bulb adapted for use in standard automotive bulb sockets, comprising:
a printed circuit board;

a plurality of light emitting diodes mounted on the printed circuit board and electrically coupled with the printed circuit board;

a body having a first end and a second end, with the printed circuit board attached to the body;

a base having a distal end and a proximal end, the distal end having at least one contact; and

electrical control means electrically connected between first and second contacts on the base and the printed circuit board, whereby when an electrical signal is supplied to the contacts the electrical control means transmits a processed electrical current enabling the light emitting diodes to be energized and emit light, and including at least one of the following features:

(a) the printed circuit board acts as heat sink because much of its surface area is metal plated;

(b) a jumper is provided which electrically connects at least some of the light emitting diodes in parallel so one light emitting diode can fail without causing all light emitting diodes in series with it to fail;

(c) the printed circuit board acts as a body for the bulb;

(d) multiple diodes are provided to make the bulb non-polarized;

(e) the individual light emitting diodes' intensity is greater when in brake lamp mode than when in tail lamp mode;

(f) electrical control means are provided which comprises means for producing a series of electrical pulses and applying the electrical pulses to the printed circuit board when an electrical signal is applied to the bulb; and

(g) the bulb is shaped to fit into recessed sockets in automobiles.

18. An LED light bulb as in claim 17 wherein the printed circuit board acts as heat sink because much of its surface area is metal plated.

19. An LED light bulb as in claims 17 or 18 wherein a jumper is provided which electrically connects at least some of the light emitting diodes in parallel so one light emitting diode can fail without causing all light emitting diodes in series with it to fail.

20. An LED light bulb as in one of claims 17-19 wherein the printed circuit board acts as a body for the bulb.

21. An LED light bulb as in one of claims 17-20 wherein multiple diodes are provided to make the bulb non-polarized.

22. An LED light bulb as in one of claims 17-21 wherein the individual light emitting diodes'

intensity is greater when in brake lamp mode than when in tail lamp mode.

23. An LED light bulb as in one of claims 17-22 wherein electrical control means are provided which comprises means for producing a series of electrical pulses and applying the electrical pulses to the printed circuit board when an electrical signal is applied to the bulb.

24. An LED light bulb as in one of claims 17-23 wherein the body contains a plurality of cooling holes.

25. An LED light bulb as in one of claims 17-24 wherein the individual light emitting diodes' intensity is greater when in brake lamp mode than when in tail lamp mode due to a resistor.

26. An LED light bulb as in one of claims 17-24 wherein the individual light emitting diodes' intensity is greater when in brake lamp mode than when in tail lamp mode due to a resistor electrically connected between the first contact and the printed circuit board and a resistor-diode series combination electrically connected between the second contact and printed circuit board.

27. An LED light bulb as in one of claims 17-26 wherein the bulb is shaped to fit into recessed sockets in automobiles.

28. An LED light bulb set including:
a first bulb and a second bulb wired together, the first bulb for placement in a tail light socket and the second bulb for placement in a brake/turning light socket, at least one of the bulbs being illuminated in a tail light mode, at least one of the bulbs being illuminated in a brake light mode, at least one of the bulbs being illuminated in a turning light mode; and

control means for causing both of the bulbs to be illuminated in at least one of the brake light mode and turning light mode.

29. An LED light bulb as in claim 28, wherein the control means causes both of the bulbs to be illuminated in the brake light mode and in the turning light mode.

30. An LED light bulb adapted for use in standard automotive mini wedge type bulb sockets comprising:

a bulb body comprising a printed circuit board having a front side, a rear side, and an upper side; at least one light emitting diode mounted on the upper side of the printed circuit board and electrically coupled with the printed circuit board; and

electrical control means mounted on the printed circuit board electrically connected between the

printed circuit board and at least one pair of electrical conductors.

31. An LED light bulb as in claim 30, wherein the printed circuit board acts as a body for the bulb.

32. An LED bulb comprising:

a plurality of LEDs;

circuitry to pulse the LEDs during a braking condition for a plurality of pulses at 60Hz or slower for added alert to affected motorists.

33. The LED bulb of claim 32, wherein the LEDs turn full on after a predetermined number of pulses.

34. The LED bulb of claim 32, wherein the pulses speed up until visual persistence is optimized.

35. An LED light bulb adapted for use in standard automotive bulb sockets in a brake light mode and a tail light mode, comprising:

a printed circuit board;

a plurality of light emitting diodes mounted on the printed circuit board and electrically coupled with the printed circuit board;

a body having a first end and a second end, with the printed circuit card attached adjacent the first end of the body;

first and second contacts; and

electrical control means electrically connected between first and second contacts and the printed circuit board, whereby when an electrical signal is supplied to the contacts the electrical control means transmits a processed electrical current enabling the light emitting diodes to be energized and emit light, wherein the electrical control means causes at least some light emitting diodes to illuminate when used in either the tail lamp mode or the brake lamp mode, and causes the intensity of the individual light emitting diodes to be greater when in brake lamp mode than when in tail lamp mode.

36. An LED light bulb as in claim 35 wherein the body contains a plurality of cooling holes.

37. An LED light bulb as in claim 35 wherein the electrical control means comprises a resistor.

38. An LED light bulb as in claim 35 wherein electrical control means comprising a resistor electrically connected between the first contact and the printed circuit board and a resistor-diode series combination electrically connected between the second contact and printed circuit board.

39. An LED bulb adaptable to every application with load/resistance to match impedance/resistance requirements of application.
40. A replacement LED bulb adaptable to every application with load/resistance to match impedance/resistance of AC bulb being replaced.
- 5 41. A replacement LED bulb adaptable to every application with load/resistance to match impedance/resistance of bulb being replaced.
42. An LED lamp adaptable to every AC application with load/resistance to match impedance/resistance requirements of application.
43. An LED lamp adaptable to every DC application with load/resistance to match
10 impedance/resistance requirements of application.
44. An LED bulb adaptable to every application with built in or attachable load/resistance to match impedance/resistance requirements of application.
45. A replacement LED bulb adaptable to every application with built in or attachable load/resistance to match impedance/resistance of AC bulb being replaced.
- 15 46. A replacement LED bulb adaptable to every application with built in or attachable load/resistance to match impedance/resistance of bulb being replaced.
47. An LED lamp adaptable to every AC application with built in or attachable load/resistance to match impedance/resistance requirements of application.
48. An LED lamp adaptable to every DC application with built in or attachable
20 load/resistance to match impedance/resistance requirements of application.
49. The invention of any one of claims 1-38, wherein the LED bulb is intended as a replacement bulb for a second bulb and includes built in or attachable load/resistance to match, mimic, or approximate the impedance/resistance of the second bulb.
50. The invention of any one of claims 1-38, wherein the LED bulb is intended as a
25 replacement bulb for a second bulb and includes built in or attachable load/resistance to match the impedance/resistance requirements of the application for which the second bulb is used.
51. The invention of any one of claims 1-38, wherein the LED bulb is intended as a replacement bulb for a second bulb and includes built in or attached load/resistance to match, mimic, or approximate the impedance/resistance of the second bulb.
- 30 52. The invention of any one of claims 1-38, wherein the LED bulb is intended as a replacement bulb for a second bulb and includes built in or attached load/resistance to match the impedance/resistance requirements of the application for which the second bulb is used.

53. The invention of any one of claims 1-38, wherein the LED bulb is intended as a replacement bulb for a second bulb and includes built in load/resistance to match, mimic, or approximate the impedance/resistance of the second bulb.

54. The invention of any one of claims 1-38, wherein the LED bulb is intended as a replacement bulb for a second bulb and includes built in load/resistance to match the impedance/resistance requirements of the application for which the second bulb is used.

55. The invention(s) substantially as shown and described herein.